

Amendments to the Claims:

This listing of claims replaces all prior versions, and listings, of claims in the application:

Listing of Claims:

Claims 1 – 108. (canceled)

Claim 109 (currently amended): A method of microfabricating an elastomeric structure, comprising:
microfabricating a first elastomeric layer having a recess formed therein;
microfabricating a second elastomeric layer having a recess formed therein;
positioning the second elastomeric layer on top of the first elastomeric layer; and,
bonding a bottom surface of the second elastomeric layer onto a top surface of the first elastomeric layer, the elastomeric structure having a deflectable membrane therein.

Claim 110 (withdrawn) The method of claim 109 wherein the first and second elastomeric layers are microfabricated by replication molding.

Claim 111 (withdrawn) The method of claim 109 wherein the first and second elastomeric layers are microfabricated by laser cutting.

Claim 112 (withdrawn) The method of claim 109 wherein the first and second elastomeric layers are microfabricated by chemical etching.

Claim 113 (withdrawn) The method of claim 113 wherein the first and second elastomeric layers are microfabricated by sacrificial layer methods.

Claim 114 (withdrawn) The method of claim 109 wherein the first and second elastomeric layers are microfabricated by injection molding.

Claim 115 (withdrawn) The method of claim 109 wherein:
the first elastomeric layer is fabricated on a first micromachined mold having at least one raised protrusion which forms at least one recess in the bottom of the first elastomeric layer; and

the second elastomeric layer is fabricated on a second micromachined mold having at least one raised protrusion which forms at least one recess in the bottom of the first elastomeric layer.

Claim 116 (withdrawn) The method of claim 115 wherein the first micromachined mold has at least one first raised protrusion which forms at least one first channel in the bottom surface of the first elastomeric layer.

Claim 117 (withdrawn) The method of claim 116 wherein the second micromachined mold has at least one second raised protrusion which forms at least one second channel in the bottom surface of the second elastomeric layer.

Claim 118 (withdrawn) The method of claim 117 wherein a bottom surface of the second elastomeric layer is bonded onto a top surface of the first elastomeric layer such that the at least one second channel is enclosed between the first and second elastomeric layers.

Claim 119 (withdrawn) The method of claim 116 further comprising positioning the first elastomeric layer on top of a planar substrate such that the at least one first channel is enclosed between the first elastomeric layer and the planar substrate.

Claim 120 (withdrawn) The method of claim 116 wherein a hermetic seal is formed between the bottom of the first layer and the top of the planar substrate.

Claim 121 (withdrawn) The method of claim 109 further comprising:
microfabricating an nth elastomeric layer; and
bonding the bottom surface of the (n-1)th elastomeric layer onto a top surface of the nth elastomeric layer.

Claim 122 (withdrawn) The method of claim 109 further comprising:
sequential addition of further elastomeric layers, whereby each layer is added by:
microfabricating a successive elastomeric layer; and
bonding the bottom surface of the successive elastomeric layer onto a top surface of the elastomeric structure.

Claim 123 (withdrawn) A method of microfabricating an elastomeric structure comprising:
providing a first microfabricated elastomeric structure;
providing a second microfabricated elastomeric structure; and
bonding a surface of the first elastomeric structure onto a surface of the second elastomeric structure.

Claim 124 (withdrawn) The method of claim 109 wherein at least one of the first elastomeric layer and the second elastomeric layer are fabricated from a material selected from the group consisting of:
elastomeric compositions of polyisoprene, polybutadiene, polychloroprene, polyisobutylene, poly(styrene-butadiene-styrene), the polyurethanes, and silicones.

Claim 125 (withdrawn) The method of claim 109 wherein at least one of the first elastomeric layer and the second elastomeric layer are fabricated from a material selected from the group consisting of:

poly(bis(fluoroalkoxy)phosphazene) (PNF, Eypel-F), poly(carborane-siloxanes) (Dexsil), poly(acrylonitrile-butadiene) (nitrile rubber), poly(1-butene), poly(chlorotrifluoroethylene-vinylidene fluoride) copolymers (Kel-F), poly(ethyl vinyl ether), poly(vinylidene fluoride), poly(vinylidene fluoride – hexafluoropropylene) copolymer (Viton).

Claim 126 (withdrawn) The method of claim 109 wherein at least one of the first elastomeric layer and the second elastomeric layer are fabricated from a composition selected from the group consisting of:

polyvinylchloride (PVC), polysulfone, polycarbonate, polymethylmethacrylate (PMMA), or polytertrafluoroethylene (Teflon).

Claim 127 (withdrawn) The method of claim 124 wherein at least one of the first elastomeric layer and the second elastomeric layer are fabricated from a material selected from the group consisting of polydimethylsiloxane (PDMS) such as General Electric RTV 615, Dow Chemical Corp. Sylgard 182, 184, or 186, and aliphatic urethane diacrylates such as Ebecryl 270 or Irr 245 from UCB Chemicals.

Claim 128 (withdrawn) The method of claim 109 wherein the first elastomeric layer has an excess of a first chemical species and the second elastomeric layer has an excess of a second chemical species.

Claim 129 (withdrawn) The method of claim 128 wherein the elastomeric layers comprise thermoset elastomers which are bonded together by heating above an elastic/plastic transition temperature of at least one of the first and second elastomeric layers.

Claim 130 (withdrawn) The method of claim 128 wherein the first and second chemical species comprise different molecules.

Claim 131 (withdrawn) The method of claim 128 wherein the first and second chemical species comprise different polymer chains.

Claim 132 (withdrawn) The method of claim 128 wherein the first and second chemical species comprise different side groups on the same type of polymer chains.

Claim 133 (withdrawn) The method of claim 128 wherein the first chemical species forms bonds with the second chemical species when at least one chemical species is activated.

Claim 134 (withdrawn) The method of claim 133 wherein the at least one chemical species is activated by light.

Claim 135 (withdrawn) The method of claim 133 wherein the at least one chemical species is activated by heat.

Claim 136 (withdrawn) The method of claim 133 wherein the at least one chemical species is activated by the addition of a third chemical species.

Claim 137 (withdrawn) The method of claim 136 wherein the at least one chemical species diffuses through the elastomer structure.

Claim 138 (withdrawn) The method of claim 128 wherein the first and second elastomeric layers are formed of different elastomeric materials.

Claim 139 (withdrawn) The method of claim 128 wherein the first and second elastomeric layers are initially composed of the same elastomeric material, and an additional elastomeric material is added to one of the first and second layers.

Claim 140 (withdrawn) The method of claim 128 wherein the first and second elastomeric layers are composed of the same component materials, but differ in the ratio in which the component materials are mixed together.

Claim 141 (withdrawn) The method of claim 140 wherein each of the elastomeric layers is made of two-part silicone.

Claim 142 (withdrawn) The method of claim 141 wherein each elastomeric layer comprises an addition cure elastomer system.

Claim 143 (withdrawn) The method of claim 141 wherein the silicone comprises two different reactive groups and a catalyst.

Claim 144 (withdrawn) The method of claim 143 wherein the first reactive group comprises silicon hydride moieties, the second reactive group comprises vinyl moieties, and the catalyst comprises platinum.

Claim 145 (withdrawn) The method of claim 144 wherein each elastomeric layer comprises G.E. RTV 615.

Claim 146 (withdrawn) The method of claim 145 wherein the first elastomeric layer is mixed with a ratio of less than 10A:1B (excess Si-H groups) and the second elastomeric layer is mixed with a ratio of more than 10A:1B (excess vinyl groups).

Claim 147 (withdrawn) The method of claim 146 wherein the first elastomeric layer has a ratio of 3A:1B (excess Si-H groups) and the second elastomeric layer has a ratio of 30A:1B (excess vinyl groups).

Claim 148 (withdrawn) The method of claim 128 wherein each of the elastomeric layers are made of polyurethane.

Claim 149 (withdrawn) The method of claim 148 wherein the polyurethane comprises Ebecryl 270 or Irr 245 from UCB Chemicals.

Claim 150 (withdrawn) The method of claim 109 wherein the first and second elastomeric layers are made of the same material.

Claim 151 (withdrawn) The method of claim 150 wherein at least one of the first and second elastomeric layers are incompletely cured.

Claim 152 (withdrawn) The method of claim 150 wherein both the first and second elastomeric layers comprise a crosslinking agent.

Claim 153 (withdrawn) The method of claim 152 wherein the crosslinking agent is activated by light.

Claim 154 (withdrawn) The method of claim 152 wherein the crosslinking agent is activated by heat.

Claim 155 (withdrawn) The method of claim 152 wherein the crosslinking agent is activated by an additional chemical species.

Claim 156 (withdrawn) The method of claim 150 wherein the elastomeric layers comprise thermoset elastomers which are bonded together by heating above an elastic/plastic transition temperature of at least one of the first and second elastomeric layers.

Claim 157 (withdrawn) The method of claim 109 wherein the first and second layers are bonded by a layer of adhesive.

Claim 158 (withdrawn) The method of claim 157 wherein the adhesive comprises an uncured elastomer which is cured to bond the first and second elastomeric layers together.

Claim 159 (withdrawn) The method of claim 158 wherein the adhesive comprises the same material as at least one of the first or second elastomeric layers.

Claim 160 (withdrawn) The method of claim 109 wherein at least one of the elastomeric layers further comprises a conductive portion.

Claim 161 (withdrawn) The method of claim 160 wherein the
conductive portion is made by metal deposition.

Claim 162 (withdrawn) The method of claim 161 wherein the
conductive portion is made by sputtering.

Claim 163 (withdrawn) The method of claim 161 wherein the
conductive portion is made by evaporation.

Claim 164 (withdrawn) The method of claim 161 wherein the
conductive portion is made by electroplating.

Claim 165 (withdrawn) The method of claim 161 wherein the
conductive portion is made by electroless plating.

Claim 166 (withdrawn) The method of claim 161 wherein the
conductive portion is made by chemical epitaxy.

Claim 167 The method of claim 160 wherein the conductive portion is
made by made by carbon deposition.

Claim 168 (withdrawn). The method of claim 167 wherein the
conductive portion is made by mechanically rubbing material directly onto the
elastomeric layer.

Claim 169 (withdrawn) The method of claim 167 wherein the
conductive portion is made by exposing the elastomer to a solution of carbon particles in
solvent.

Claim 170 (withdrawn) The method of claim 169 wherein the
solvent causes swelling of the elastomer.

Claim 171 (withdrawn) The method of claim 169 wherein the elastomer comprises silicone and the solvent comprises a chlorinated solvent.

Claim 172 (withdrawn) The method of claim 167 wherein the conductive portion is made by electrostatic deposition.

Claim 173 (withdrawn) The method of claim 167 wherein the conductive portion is made by a chemical reaction producing carbon.

Claim 174 (withdrawn) The method of claim 160 wherein the conductive portion is made by:
 patterning a thin layer of metal on a flat substrate;
 adhering the elastomeric layer onto the flat substrate; and
 peeling the elastomeric layer off the flat substrate, such that the metal sticks to the elastomeric layer and comes off the flat substrate.

Claim 175 The method of claim 174 wherein the adhesion of the metal to the flat substrate is weaker than the adhesion of the metal to the elastomer.

Claim 176 (withdrawn) Method of claim 160 wherein the conductive portion is patterned.

Claim 177 (withdrawn) The method of claim 176 wherein the conductive portion is patterned by masking a surface of the conductive portion with a patterned sacrificial material.

Claim 178 (withdrawn) The method of claim 176 wherein the conductive portion is patterned by:
 depositing a sacrificial material on one of the elastomeric layers,
 patterning the sacrificial material,
 depositing a thin coat of conductive material thereover, and
 removing the sacrificial material.

Claim 179 (withdrawn) The method of claim 176 wherein the
conductive portion is patterned by masking the surface with a shadow mask.

Claim 180 (withdrawn) The method of claim 179 wherein the
conductive portion is patterned by:
 positioning a shadow mask adjacent to an elastomeric layer;
 depositing a thin coat of conductive material through apertures in the
shadow mask; and
 removing the shadow mask.

Claim 181 (withdrawn) The method of claim 176 wherein the
conductive portion is patterned by etching.

Claim 182 (withdrawn) The method of claim 181 wherein the
conductive portion is patterned by:
 depositing a mask layer onto one of the elastomeric layers;
 patterning the mask layer;
 etching the conductive portion through holes in the mask layer; and
 removing the mask layer.

Claim 183 (withdrawn) The method of claim 160 wherein the
conductive portion is produced by doping the elastomer with a conductive material.

Claim 184 (withdrawn) The method of claim 183 wherein the
conductive material comprises a metal.

Claim 185 (withdrawn) The method of claim 183 wherein the
conductive material comprises carbon.

Claim 186 (withdrawn) The method of claim 183 wherein the
conductive material comprises a conductive polymer.

Claim 187 (withdrawn) The method of claim 183 wherein the elastomer used is inherently conductive.

Claim 188 (withdrawn) The method of claim 160 further comprising sealing the microfabricated elastomeric structure onto a flat substrate, wherein the flat substrate comprises at least one conductive portion.

Claim 189 (withdrawn) The method of claim 188 wherein the flat substrate is covered by an insulating layer.

Claim 190 (withdrawn) The method of claim 54 wherein at least one of the first or second elastomeric layers comprises a magnetic portion.

Claim 191 (withdrawn) The method of claim 190 wherein the magnetic portion is composed of an intrinsically magnetic elastomer.

Claim 192 (withdrawn) The method of claim 190 wherein the magnetic portion is composed of an elastomer doped with a magnetic material.

Claim 193 (withdrawn) The method of claim 192 wherein the magnetic dopant is a magnetically polarizeable material.

Claim 194 (withdrawn) The method of claim 193 wherein the magnetic dopant is fine iron particles.

Claim 195 (withdrawn) The method of claim 192 wherein the magnetic dopant is a permanently magnetized material.

Claim 196 (withdrawn) The method of claim 195 wherein the permanently magnetized material is NdFeB or SmCo magnetized by exposure to a high magnetic field.

Claim 197 (withdrawn) The method of claim 190 wherein pieces of magnetic material are relatively large compared with the size of the magnetic portion are incorporated into the elastomer.

Claim 198 (withdrawn) The method of claim 197 wherein the magnetic material is a magnetically polarizeable material.

Claim 199 (withdrawn) The method of claim 198 wherein the magnetic material is iron.

Claim 200 (withdrawn) The method of claim 197 wherein the magnetic material is permanently magnetized.

Claim 201 (withdrawn) The method of claim 200 wherein the permanently magnetized material is NdFeB or SmCo magnetized by exposure to a high magnetic field.

Claim 202 (withdrawn) The method of claim 190 further comprising providing a structure capable of generating a switchable magnetic field, disposed adjacent to said magnetic portion, such that the application of said magnetic field to the elastomeric structure causes the generation of a force on the magnetic portion.

Claim 203 (withdrawn) The method of claim 202 wherein the structure generating the magnetic field is a magnet coil.

Claim 204 (withdrawn) The method of claim 202 wherein the structure generating the magnetic field is a substrate with at least one microfabricated magnet coil disposed thereon.

Claims 205-291 (canceled)